

REMARKS

This application includes pending claims 9-26. Claims 9, 18, and 19 are amended. Reexamination and reconsideration of the application are requested.

Summary Of Rejection

Claims 9-26 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,301,859 issued to Nakamura et al. (the "Nakamura Patent") in view of U.S. Patent 4,896,048 issued to Boeckmann (the "Boeckmann Patent"). The Examiner describes the Nakamura Patent as disclosing the heat seal die described in Applicants' independent claims 9 and 18, but acknowledges that the Nakamura Patent does not disclose a form/fill/seal apparatus, a heat sealable material feeder, and a flowable material feeder. The Examiner cites the Boeckmann Patent as describing those features not disclosed in the Nakamura Patent and reasons that it would have been obvious to one of ordinary skill in the art, at the time Applicants' invention was made, to combine and modify the Nakamura Patent and the Boeckmann Patent teachings to provide a method and a system that include a heat sealable material feeder, flowable material feeder, and a form/fill/seal apparatus that is effective at producing air tight and leak proof packages. Figs. 11A and 11B are specifically cited as teaching the use of heat tubes or heat pipes in heat seal dies. The Examiner acknowledges that neither the Nakamura Patent nor the Boeckmann Patent mention the size of the package being made, but the Examiner reasons that it would have been obvious to one of ordinary skill in the art at the time the invention was made to produce packages of portion size in the range desired. This rejection is respectfully traversed.

Summary of Reasons For Traversal

Applicants respectfully submit that the Nakamura Patent and the Boeckmann Patent do not establish a prima facie case of obviousness under §103 because the Nakamura Patent expressly teaches away from using heat tubes in heat sealing dies (see col. 9, l. 44 – col. 10, l. 27)

such that there is no motivation to combine the references and there is no reasonable expectation of success in combining the references. Furthermore, several secondary considerations such as failure to appreciate the problem to be solved, long felt but unsatisfied need despite availability of components, unexpected results, existence of licensees, and commercial success are evidence that the subject matter of the independent claims of this application describe patentable subject matter.

This response is supported by the Cigallio and Dougherty Declarations, which are cited below as evidence. Both Mr. Cigallio and Mr. Dougherty are named inventors in this application and experts in the field of printed flexible packaging technology. Cigallio Declaration, ¶ 1, and Dougherty Declaration, ¶ 1.

Applicant's Independent Claims

Independent claim 9 of this application describes a system for making portion control sized package flowable liquid-containing material comprising a form/fill/seal apparatus and a heat seal die that includes longitudinal heat seal tubes for substantially uniform heating of the die face of the heat seal die. Independent claim 18 describes a corresponding method for making portion control sized packaged flowable liquid-containing material. Portion control sized packaging is packaging that controls the amount of packaged product provided to the end user. Cigallio Declaration, ¶ 2. For example, condiments such as ketchup and mustard are packaged in portion control packages for use by fast-food consumers. Cigallio Declaration, ¶ 2. An enclosed excerpt from the website, www.portionpac.com shows use of portion control packages in context. Portion control packaging does not merely refer to a packaging process wherein the portion of material being packaged is controlled during packaging, as suggested by the Examiner.

More particularly, the system of claim 9 describes a heat sealable material feeder, a flowable material feeder for feeding a flowable liquid-containing material, and a form/fill/seal

apparatus structured and arranged for making portion control sized packages. Specifically, this form/fill/seal apparatus is structured and arranged for receiving the heat sealable material, forming a portion control sized package with the heat sealable material, filling the portion control sized package with the flowable liquid-containing material, and sealing the portion control sized package. The form/fill/seal apparatus includes a heat seal die comprising first and second heating elements and first and second longitudinal heat tubes disposed, respectively, in first and second die members. The heat tubes, which can also be described as heat pipes, are disposed between the heating element and the die face of each die member for maintaining a substantially uniform heat seal temperature along the length of the die faces. The substantial uniformity of heat seal die temperature significantly decreases the occurrence of serum leakers, which are packages that leak liquid through the package seal. Cigallio Declaration, ¶ 5.

As explained in Applicants' specification, heat tubes (heat pipes) typically comprise a closed metal tube, a wick disposed in the tube, and liquid disposed in a portion of the remaining volume of the tube. As the temperature along the heat tube changes, the fluid in the hotter area of the tube boils, picking up latent heat of vaporization. This high pressure travels to the lower pressure (cooler) area of the tube and condenses, thus transferring heat to the cooler area. This cycle in the heat tube equilibrates the temperature across the heat seal die members and keeps the temperature substantially uniform. See Specification, p. 3, ¶ 15; Cigallio Declaration, ¶ 6.

The Problem To Be Solved

Form/fill/seal machines for making Portion control sized packages simultaneously seal the bottoms, and then the tops of several packages, as many as 12 or more packages at once. In this circumstance, uniform temperature, pressure, and dwell time across the flexible packaging material are critical. When sealing flexible packaging material to make portion control sized packaging, the two opposing faces of the flexible material must be heated to at least a

temperature at which the material softens, but not so high as to liquefy. The softened surfaces must be pressed together and maintained in intimate contact for a time sufficient to allow the entanglement of polymeric molecules across the interface separating the surfaces. As the sealed area cools, the entangled polymers effectively weld the two surfaces together, eliminating the previously separate surfaces and becoming a monolithic layer of material with thickness approximately equal to the sum of respective thickness of each of the two materials. This combination of pressure, temperature, and time of pressure application (dwell time) constitute the three basic variables used to control heat sealing processes. Cigallio Declaration, ¶ 7.

In portion control packaging, narrow channel leaks can be formed when heat sealing flexible materials together to form the packages, particularly when the temperature along the length of the heat seal die is non-uniform such that the temperature in some areas falls below that required for adequate heat sealing. These narrow channel leaks can escape detection until after the portion control packages are packed and distributed in bags or cases. Channel leaks in portion control packages leak serum from the flowable material inside the packages and can contaminate the entire contents of bags or cases of portion control sized packages. Cigallio Declaration, ¶ 8.

The Cited References

The Nakamura Patent teaches conventional form/fill/seal packaging and does not relate to what is known in the industry as portion control size packaging. The Nakamura Patent teaches using heat sealing jaws comprising heat conducting members 33a and 33b such as solid rods of copper having a high conductivity, instead of heat tubes or heat pipes as described in amended independent claims 9 and 18 of this application. Col. 8, l. 39-42. The heat seal jaws disclosed in the Nakamura Patent are not for portion control sized packaging as they are larger and include an integral cutter blade 30 and cutter groove 22 for simultaneously cutting flexible packaging upon

heat sealing. The Nakamura Patent describes a concern with heat transfer through the depth of the heat seal dies from the heating element to the die face. The solution in the Nakamura Patent is to place the high conductivity solid copper rods between the heating elements and the die face of the heat sealing jaws. Cigallio Declaration, ¶ 9.

The Nakamura Patent expressly teaches that heat tubes (heat pipes) should not be used in the heat sealing dies, taking the position that heat tubes do not distribute heat adequately in the radial direction. Col. 9, l. 44 - col.10, l.27. Figs. 11A and 11B of the Nakamura Patent illustrate a prior art heat seal die comprising heat tubes, but the specification of the Nakamura Patent teaches that heat tubes should not be used. Cigallio Declaration, ¶ 10.

The Boeckmann Patent does not relate to the use of heat tubes (heat pipes) or heat conducting members in heat sealing jaws, but rather, addresses the problem of package leaks formed by stretching the plastic film when heat sealing to reduce wrinkling. According to the Boeckmann Patent, reducing wrinkling of the film reduces leaks in the packaging. Cigallio Declaration, ¶ 11.

No Prima Facie Obviousness

According to M.P.E.P. §2142, three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or modification, either in the references themselves or the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. The teaching or suggestion to make the claim combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure. *In re Vaeck*, 947 F.2d 488 20 U.S.P.Q. F.2d 1438 (Fed. Cir. 1991). Furthermore, prior art that teaches away from the claimed invention demonstrates a lack

of *prima facie* obviousness. *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986); *In re Fine*, 873 F.2d 1078, 5USPQ 2nd 1596 (Fed. Cir. 1988).

None of the three basic criteria of *prima facie* obviousness are met here and applicants respectfully submit that the Nakamura Patent and the Boeckmann Patent do not establish a *prima facie* case of obviousness against amended claim 9 and 18 of this application. First, there is no motivation to combine the Nakamura Patent and Boeckmann Patent, because the Nakamura Patent actually teaches away from using heat tubes, does not suggest using heat tubes in portion control sized packaging systems, and certainly does not appreciate the problems particular to the smaller, thinner portion control sized packaging heat seal dies. With portion control sized packaging heat seal dies, there is little concern about heat transfer through the depth of the dies, as they are small and thin. Instead, the concern is uniformity of temperature along the long length of the dies. This problem is well addressed by Applicants' invention as defined in independent claims 9 and 18 of this application, while the Nakamura Patent does not address portion control sized packaging systems or this problem, and even teaches away from using heat tubes. Cigallio Declaration, ¶ 12.

Furthermore, there would have been no reasonable expectation of success to one of ordinary skill in the art at the time the invention was made in view of the Nakamura Patent which clearly teaches not using heat tubes in heat seal dies. The Nakamura Patent describes heat tubes as inadequate in heat sealing. Perhaps that is true for the heat dies described in the Nakamura Patent, but Applicants' have shown that it is very effective in heat seal dies for portion control form/fill/seal packaging systems. Cigallio Declaration, ¶ 13.

In addition, the combination of the Nakamura Patent and Boeckmann Patent does not result in the invention described in independent claims 9 and 18. The Boeckmann Patent solves heat seal packaging leaks by stretching the plastic film during heat sealing to reduce wrinkling.

The Boeckmann Patent makes no reference to portion control sized packaging or equipment for making portion control sized packaging and does not suggest using heat tubes to solve the problem addressed by Applicant's invention. Accordingly, the Boeckmann Patent does not add the shortcomings of the Nakamura Patent. Cigallio Declaration, ¶ 14.

The Nakamura Patent, at col. 1, lines 13-55, describes "weighing and packaging... each article M...[where e]ach article M may be one or a quantity of edible or non-edible items, for example, potato chips, fruits, candies, vegetables, screws, nails, bolts or other things desired or required to be bagged." As such, the packaging system description includes a lengthy list of machinery components to deliver and weigh the kind of *discreet* articles provided as examples: dispensing feeder of...inverted conical shape; vibratory hoppers; pool hopper; weighing cells; control device...to select a combination of some or all of the weighing hoppers; and gates of some or all of the weighing hoppers. Cigallio Declaration, ¶ 15.

The portion control packaging machinery system encompassed by Applicants' claims differs from that in Nakamura in significant ways. In particular, the system and method of Applicants' claims 9 and 18 packages product comprising not several *discreet items* (the sum of whose weight equals a specified amount), but rather a *liquid-containing material*, of higher or lower viscosity as the case may be. The amount of product packaged depends on volume, not weight. As a result, the process used to deliver product to each package use on volumetric displacement, not weighing cells. The packaging machinery in Figure 10 of the Nakamura Patent produces one bag filled with article "M" with each cycle described in the text cited. The technology of claims 9 and 18 encompasses a preferred embodiment wherein multi-lane portion control packaging machinery system makes many (equal to the number of lanes) pouches with each cycle of product delivery. This multi-lane, multi-pouch production cycle efficiently produces portion control liquid containing products such as condiments. The subject matter of

claims 9 and 18 provides consistent seal integrity across multiple lanes of this machinery. In contrast, the Nakamura Patent teaches that heat tubes do not adequately maintain an acceptable longitudinal temperature variation (i.e. in the direction “X” as indicated in Figure 1A) for heat-seal jaws (Column 9; lines 44-67). In fact, multi-lane portion control packaging machinery has heat-seal jaws with much less depth (Dimension “Y” in Figure 1b) than the packaging machinery described in the Nakamura Patent. Cigallio Declaration, ¶ 16.

The criteria of prima facie obviousness are therefore not met by the Nakamura Patent and the Boeckmann Patent. Accordingly, Applicant’s respectfully submit that the rejection of Applicants’ amended claims under the Nakamura and Boeckmann patents be removed.

Secondary Considerations

A fourth factor that must be considered in evaluating nonobviousness is a number of “secondary considerations.” *Graham v. John Deere*, 383 US1, 17, 86 Supreme Court 684, 694, 148 USPQ 459, 467 (1966); *Simmons Fastener Corp. v. Illinois Tool Works*, 739 F.2d 1573, 1575, 22 USPQ 744, 746 (Fed. Cir. 1984). Such secondary considerations include, but are not limited to, unexpectedness of the results of the claimed invention to those skilled in the art; a long felt but unsatisfied need for the claimed invention while the needed implementing arts and elements have long been available; commercial success of the invention causally related to the invention itself, rather than to companion factors such as advertising or attractive packaging; replacement in the industry of prior art devices by the patented invention; acquiescence by the industry to the patent’s validity by taking licenses under the patent; and teaching away from the technical direction in which the patentee went by those skilled in the art. *Graham v. John Deere* at 148 USPQ 467.

Unexpected Results

Embodiments of the invention encompassed by independent claims 9 and 18 demonstrate unexpectedly superior results over prior art devices. Generally, during heat sealing of portion control packaging, the temperature variation across heat seal dies made in accordance with embodiments encompassed by independent claim 9 of this invention are substantially less than the temperature variation across heat seal dies made in accordance with the prior art (without heat tubes). Cigallio Declaration, ¶ 17.

Figures 1 and 2, below, are graphic representations of temperature distribution across the top and bottom sealing bars on a type of portion control sized packaging machine called a multi-lane four-side seal pouch machine. Figure 1 illustrates a prior art form/fill/seal machine and Figure 2 illustrates an embodiment of the present invention, as described by claims 9 and 18 of this application. During actual commercial production, the prior art machine shows a temperature difference of 23 degrees F across the front sealing bar of the heat seal die and a 31 degree F difference across the back sealing bar of the heat seal die. Such variation across the width of these seal bars can result in insufficient heating and sealing of the pouches. As can be seen in Figure 2, with an embodiment of the present invention, these differences drop to 8 and 4 degrees F, respectively. Cigallio Declaration, ¶ 18.

The heat seal die of the prior art machine was made of steel and did not include heat tubes. The heat seal die of the invention embodiment was made of hardened 440 stainless steel and included heat tubes. Cigallio Declaration, ¶ 19.

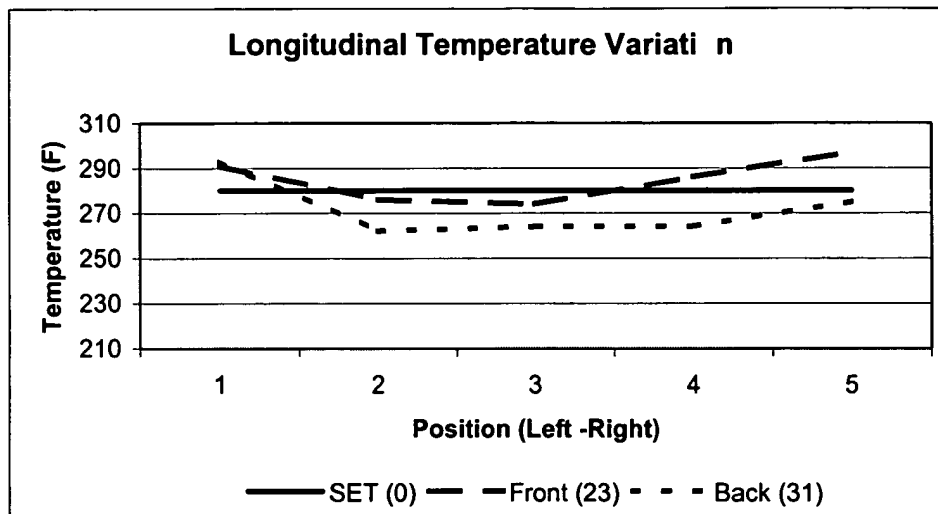


Figure 1: Operating Profile Without Invention

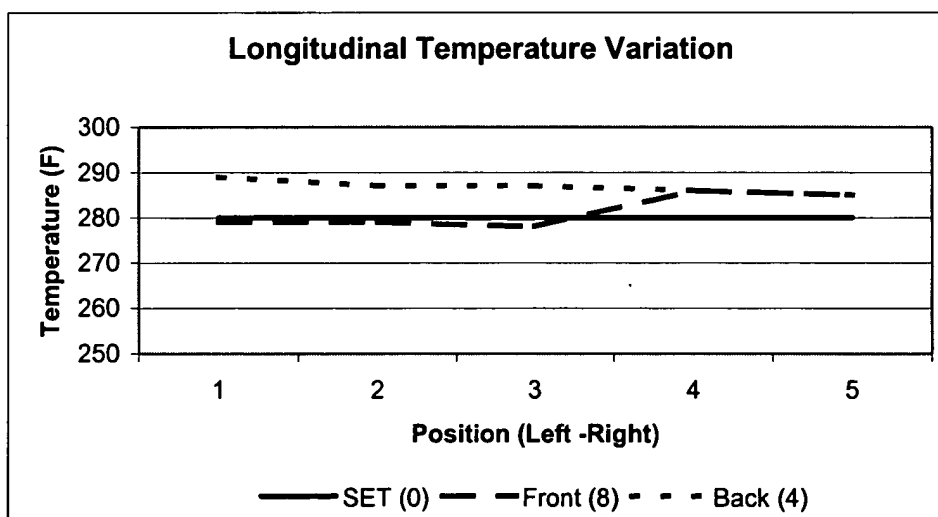


Figure 2: Operating Profile With Invention

Applicants submit for consideration the unexpected results illustrated in Figure 2 hereinabove as evidence of nonobviousness. These results are particularly unexpected in view of the disclosure in the Nakamura Patent, which teaches that heat tubes are inadequate for controlling temperature in heat seal dies. Cigallio Declaration, ¶ 20.

Commercial application of embodiments of this invention have also been unexpectedly successful. Golden States Foods (GSF) is a licensee under this patent application and uses

form/fill/seal machines for manufacturing portion control packaged condiments such as ketchup. GSF is the largest supplier of liquid products to McDonald's restaurants. Cigallio Declaration, ¶ 21.

In January 2002, the owner of this patent application, Printpack, in conjunction with GSF, installed embodiments of the invention encompassed by claims 9 and 18 of this application in a GSF liquid products plant in Conyers, Georgia. The embodiments implemented by Printpack and GSF were multi-lane, four side form/fill/seal machines for making portion control packaged condiments equipment with hardened stainless steel cross heat seal dies including longitudinal heat tubes (hereinafter the Embodiments). Prior to implementation of these Embodiments, GSF operated this form/fill/seal machines with cross heat seal dies made of steel and lacking heat tubes. (the Prior Art Machines). Cigallio Declaration, ¶ 22.

The Prior Art Machines operated by GSF exhibited temperature variations exceeding 60°F across the cross heat seal dies, while specifications for the packaging film used normally set a 20°F variation. Such a discrepancy between film specifications for heat seal die temperature variation and actual cross heat seal die temperature variation in the Prior Art Machines reduced the seal integrity of the portion control packaging and increased the number of serum leakers. Cigallio Declaration, ¶ 23.

The Embodiments installed and implemented at GSF in January 2002 reduced the temperature variation across the cross heat seal dies to less than 10°F and thereby significantly enhanced the cross seal integrity of the portion control packaging produced. As a result, the number of cases of portion control packaged condiments withheld from distribution by GSF due to serum leakers dropped by 79% and labor necessary to rework such withheld cases dropped by about \$75,000 annually. The reduction in serum leakers also enhanced the quality of product delivered to GSF's customers. Cigallio Declaration, ¶ 24.

Thus, the success of GSF in commercially operating embodiments of this invention is further evidence of the nonobviousness of the subject matter in claims 9 and 18 of this application.

Long Felt, But Unsatisfied Need

Reducing serum leakers in portion controlled packaging has been a long felt, but unsatisfied need in the packaging industry. Cigallio Declaration, ¶ 25. A publication titled “Portion Control and Flexible Packaging: A Reference Manual for the Dressings & Sauces Industry First Edition,” (The Association of Dressings & Sauces; August 1999; Atlanta, Ga; 150 pages) (hereinafter the “Manual”) provides guidelines for portion control packaging of liquid containing materials such as condiments and sauces. Applicants have previously submitted an excerpt from this publication. This Association of Dressings & Sauces serves the market at which the invention described in the present application is directed. The Manual generally indicates that serum leakers are considered a serious problem in the portion control packaging industry. See *Manual*, pages 132-137. The Manual advises as follows:

“Packaging films have changed dramatically over the last 20 years, yet serum leakers were there then and they are still here now. Studies have been done varying sealant materials and sealant thickness along with packaging machine conditions.”

See *Manual*, page 134.

The Manual speculates that “gathering of the film and subsequent wrinkles may be the cause of most serum leakers.” See *Manual* page 132. The *Boeckmann* patent cited in the Office Action also focuses on wrinkles as the source of the problem. The Manual suggests that portion control packaging machines must be maintained very diligently to minimize serum leakers. See *Manual*, page 134.

In “Table 8-4-Leaker analysis for Problem Solving”, the Manual describes seven (7) types of defects from leaking, three (3) of which involve seal area faults.

Observed Defect	Possible Cause	Pattern	Action
Unsealed Seam Areas [5 of 7] 1)	Inadequate amount of sealant	No bonding in seal area. Gaps or spaces in seam	Confirm thickness of sealant layer against specification
2)	Defective composition of sealant layer	Reduced bond strength in seal area. Seam degenerates over storage	Packaging material defect
3)	Sealing temperature too low on sealing bars	No bonding in seal area. Leakers occur in same lane of equipment	Test and verify temperatures of heat seal bars. Replace units as needed
4)	Inadequate pressure on sealing bars, or poor mating of sealing bars	Reduced bond strength in seal area. Leakers will occur in repeat locations	Verify pressure with pressure sensitive paper. Replace springs as needed
5)	Inadequate dwell time on sealing bars	Reduced bond strength in seal area. Leakers occur in repeat locations	Reduce operating speeds. Timing adjustment
Cracks in seal area. [6 of 7]	Excessive pressure on sealing bars	1) Small breaks across seal area, or localized 2) Melted appearance or fracturing at seams	1) Adjust equipment. 2) Reduce and verify sealing bar temperatures
Serum Leakers after 30 days [7 of 7]	Excessive heat or pressure on the package in storage may contribute to serum leaker occurrence from any cause	Serum leakage from package during storage. Very small seam interruption	Reduce storage effect if possible. Increase grade of corrugated material if needed.

Manual, Pp. 80-82

The *Manual* is a current summary of industry beliefs and practices presents conflicting views on the causes of and remedies for leakers in multi-lane portion control packages. High temperatures and pressures are implicated in some cases (Table 8-4, 5.3, 5.5, and 6.2), while Appendix A No. 4 blames low temperatures and pressures. The one potentially consistent remedy, "reduce operating speed" (Table 8-4, 6.2) is not an economical option. While mention is made about "adjusting" and maintaining the performance of the packaging machinery components, no consideration is given to the ability of the machinery to maintain the tolerances necessary to prevent leakers and there is no recognition that uniformity of temperature across the heatseal die causes leakers. Cigallio Declaration, ¶ 28.

Furthermore, according to cited U.S. Patent 3,677,329 issued to *Kirkpatrick*, heat tubes have been available for over thirty years, but to Applicants' knowledge, they have not been implemented in portion control sized packaging heat seal dies until Applicants' invention. This could be due to the prior understanding in the art that heat tubes will be unsuitable, as taught by the *Nakamura* Patent. Cigallio Declaration, ¶ 29.

The long felt need for reducing serum leakers in portion control size packaging is finally satisfied by the invention described in the claims of the present application. The combination of the long felt need for reducing serum leakers and the concurrent availability of heat tubes and other endeavors establishes the nonobviousness of the system and method for portion control size packaging described in the independent claims of this application. Applicants respectfully submit that with this evidence of nonobviousness, the obviousness rejection based on *Nakamura* and *Boeckmann* is overcome.

Commercial Success, Licenses, and Replacement of Prior Art Devices

The owner of the Application, Printpack, currently has licensed this technology to two producers of portion control-packaged condiments: C.F. Sauer, Mauldin, SC (CFS) and Golden States Foods, Conyers, GA (GSF). Both of these companies produce portion control-packaged condiments for a variety of fast food restaurants. Dougherty Declaration, ¶ 3.

The licenses referenced above are contingent on the sale of specified amounts of packaging material sales by Printpack to the licensees over the next several years. Under the licenses, Printpack replaced the existing heat seal dies in the licensee's form/fill/seal machines for production of portion control sized packaging and supplies 60% of the licensees packaging material volume for portion control packaging at the same price provided by competitors. In these cases, Printpack and the licensees cooperated in experiments that demonstrated the effectiveness of the technology. The licensing arrangements were made due to direct contact by Printpack representatives with the licensees. Printpack's advertising of the claimed invention was limited to this direct contact. Therefore, the commercial success of the claimed invention is not due to pricing or advertising, but rather, the technology itself. Dougherty Declaration, ¶ 4.

This commercial success, including the licensing of the technology and the replacement of prior art machines and operation with embodiments of this invention, is further evidence of the nonobviousness of the subject matter of claims 9 and 18 of this application.

Prior Art Teaches Away

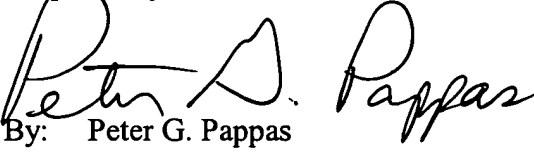
Lastly, as explained in detail hereinabove, the fact that those skilled in the art taught away from the use of heat tubes in heat seal applications according to the Nakamura patent is still more evidence of nonobviousness of the subject matter of independent claims 9 and 18.

Applicants respectfully submit that the evidence of the non-obviousness of claims 9 and 18 is overwhelming and the rejection of those claims should be withdrawn.

Conclusion

The foregoing is submitted as a full and complete response to the Office Action mailed June 13, 2003, and the allowance of all claims is respectfully requested. If there are any issues which can be resolved by a telephone conference or an Examiner's Amendment, the Examiner is invited to call the undersigned attorney at 404.853.8064.

Respectfully submitted,


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